

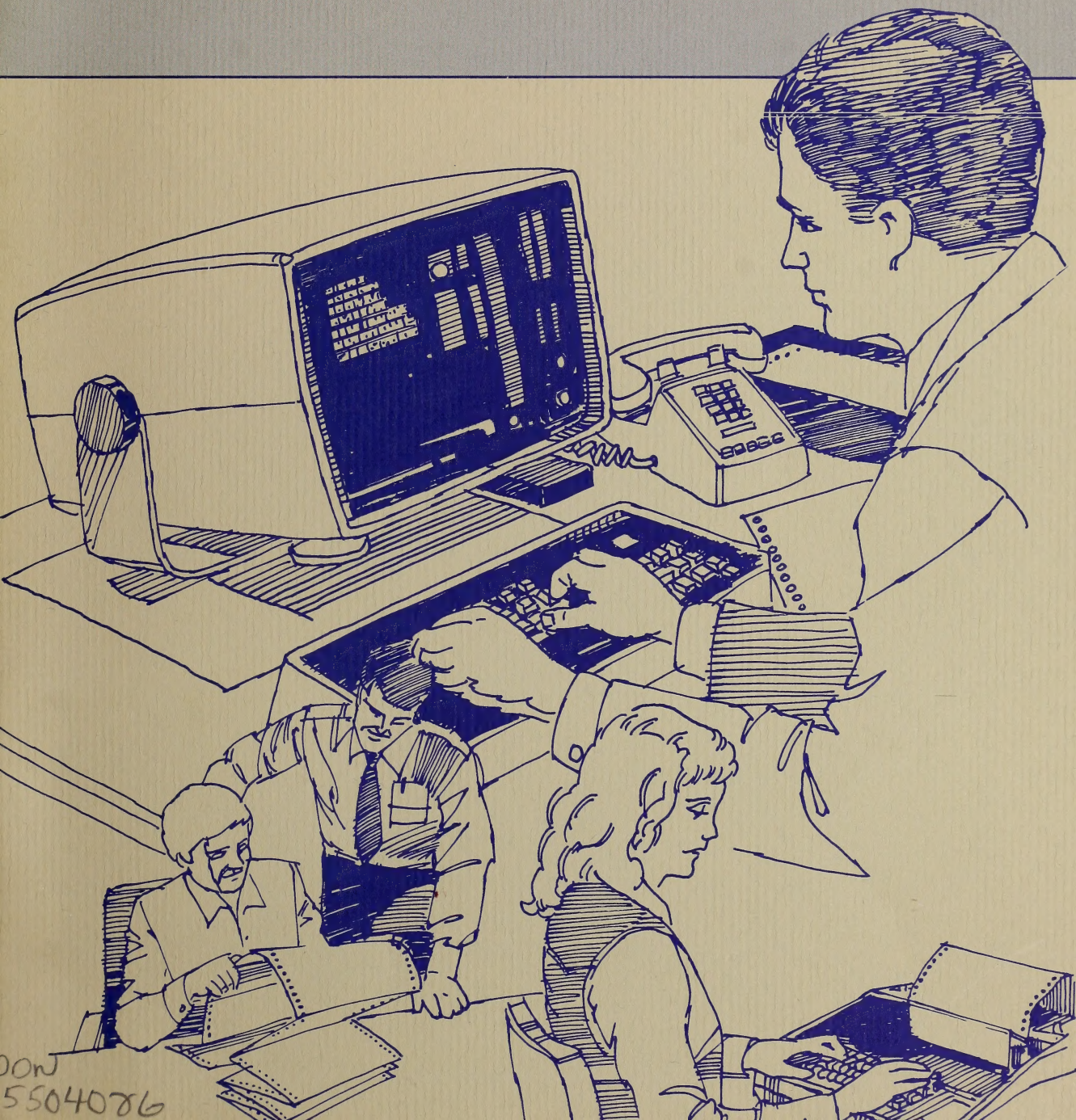
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Q-HCOMPUTER PROJECT II:

Learning about programming



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Computer Project II: *Learning About Programming*

Introduction

Welcome back to the world of computers. In *Computer Project I: Learning About Computers* you learned how the parts of the computer function, how to operate a computer keyboard, how to do calculations on a computer, how to take care of cassette tapes and diskettes, how diskettes and cassette tapes store information, and how to *load* and *run* programs from the cassette tapes and diskettes. In this project you will learn about programming a computer.

In Project I we discussed the word “program.” Do you remember the meaning of a program? Let’s review. A program is the statements and commands stored in the computer by the operator to instruct the computer how to perform. Programs must be written to the specific format for each type of computer. If you do not follow the format to the letter, the computer will not understand. This is one characteristic that makes each type of computer unique.

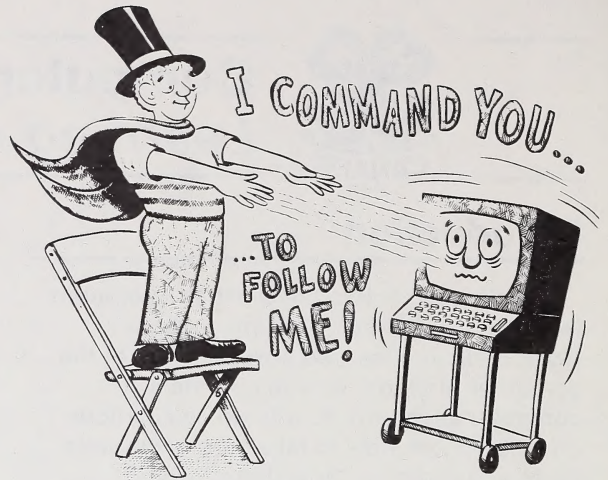
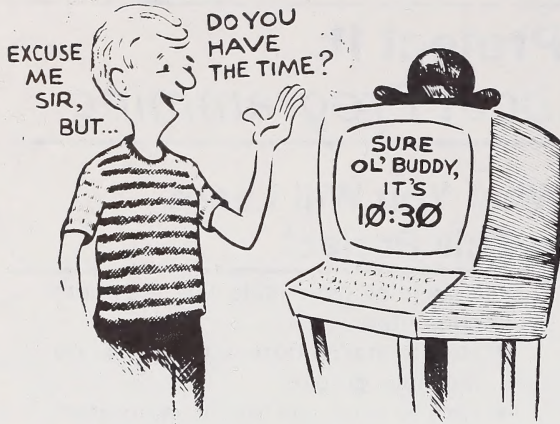
In this project you will be asked to type and run programs. The programs are already written for you in ordinary language. What you must do is look on pp. 34-35 and select the computer language—the matching computer commands or keys for your unique machine. You must type in the computer commands letter by letter. To type the keys, you simply locate and press the correct ones. Following the exercises on commands and their functions, you will complete activities in which you write your own programs.

What You Will Learn in This Project

- How to communicate with the micro-computer
- How to make information appear on the video screen
- How to write, run and list a program
- How to use input and produce output in various ways
- How to recognize specific computer instructions

What You Will Do in This Project

- Type commands
- Write programs
- Run programs
- Change short programs
- Give a demonstration on a computer
- Keep a record of your 4-H computer project



Computers Are All Around Us

Computers are used widely. You can find them in banks and businesses, in many government offices, in schools, and in some homes, maybe yours. You can even find them in typewriters, microwave ovens, cars, and wristwatches.

Where have you seen computers used in your community?

book use the BASIC computer language—the language used by most microcomputers.

Before You Begin

First you must know the type of computer you will be using. Then you must find the computer keys or commands for your computer that match the English instructions below. Use the list on pp. 34-35. When you find the proper key or command for each of these instructions, write the names in the spaces provided. If a computer is available, find the keys on the keyboard. The four instructions will occur quite frequently as you work through this project. Remember the key or command that matches each instruction. Now, look up these instructions:

- stop execution key: _____
- clear key: _____
- enter/return key: _____
- new program command: _____

You, a Programmer?

The following activities will let you type short programs into the computer and see what happens. By observing the results of certain commands, you will learn how to program the computer. Each activity shows you a new command word and asks you to apply the command. Be sure to learn how these command words work since you will be using them to write programs in this computer project. The activities in this project

The following is a description of important keys on the keyboard and symbols that appear on the video display (screen). You will use these often during this project. If a computer is available, locate the keys and symbols. Remember, you will have to check the list on pp. 34-35 to find some of these keys.

Key or Symbol
stop execution key

Use
A key (or keys) that stops the computer and tells it to wait for a new command.

clear key

A key (or keys) that clears the video display but does not erase information in memory.

enter or return

A key that causes the computer to respond to any statement or information just typed (used as **ENTER**/**RETURN** in the rest of this project book).

> or **OK** or]

These symbols are called the prompt and mean that the computer is ready to receive a new statement or command.

Computers have different prompts. These are some examples. The prompt appears on the screen after you press the **ENTER/RETURN** key.

_ or ■

The underline is called the cursor and shows you, on the screen, where you will type the next character. Some microcomputers use a blinking cursor. Also, the cursor could be a white rectangle rather than an underline.



The left arrow is the backspace key on many microcomputers

Key or Symbol

Use
and is handy to correct errors. On some equipment it erases each character you backspace over. Just type or space again, and you are on your way.

Quotation marks

Comma

Semicolon

"at" symbol

Equal key (S)*

Subtraction key

Multiplication key (S)*

Addition key (S)*

Period or decimal key

Divide key

Exponential key

Greater than

Less than

These are the numbers one and zero, which are two of the 10 numbers on the keyboard.

These are the letters I and O, which are two of 26 letters on the keyboard. Notice the difference between the two letters and the two numbers.

Shift key is used with (S)* keys.

This is called the space bar key. If a blank is needed in a certain spot while typing, press the bar.

shift

space bar

*(S) means you must press the shift key while pressing that key to produce the symbol desired.

Activity 1. Your First Program

You will now learn how to clear the video screen; print words onto the video; go to a line number; and use the list, end, new and run commands.

1. First, you may need to power-up the computer and obtain the prompt indicating the BASIC language is ready to use. (Check the operations manual for your computer.) Then prepare the computer for a new program by pressing the stop execution key, clear key, **ENTER/RETURN** key; typing the new program command and pressing the **ENTER/RETURN** key. (For example, for one type of computer you may press **BREAK, CLEAR, ENTER:** type **NEW** and **ENTER.**)
2. Locate the following instructions in the list on pp. 34-35 and see how specific commands or statements for the computer are written. (See *Sample Program* below. Remember, this is an example for one type of computer. Yours may be different.)

Instructions
10 Clear the screen

20 Print to video "your name"
(Put your name between the quotes.)

30 End of program

Run the program

Sample Program
10 CLS

20 PRINT "your name"

30 END

RUN

Now do the same program for your machine. Look up the various computer commands and write the proper statements and commands for your machine. You may need to refer to the instruction manual for your machine.

Instructions

10 Clear the screen

20 Print to video "your name"
(Hint: Put your name between the quotes.)

30 End of program

Run the program

Write Your Program

10

20

30

RUN

3. If a computer is available, type your program into it. Type **RUN** and press **ENTER/RETURN**. What happened? Let's review the steps that occurred. Typing the command word **NEW** tells the computer to forget the old program, if there was one, and to receive a new program. The clear screen command clears the video display. Your name appears on the top line as a result of the **PRINT** command. **END** signals the end of the program. The numbers identify each command or statement line and the order of execution. **RUN** causes the computer to execute the program.
4. If you have forgotten what your program looks like, press the stop execution key, press the clear key, type **LIST**, and press **ENTER/RETURN**. The program that is stored in the computer will appear.
5. Now retype line 30 as follows:

30 GOTO 20

Press **ENTER/RETURN**, type **RUN**, and press **ENTER/RETURN**.

What happened? Your name appears on all lines repeatedly at the left-hand edge of the screen. There is a slight flicker as the computer prints your name over and over, going from line 30 to 20 and back to line 30. This is caused by the statement **GOTO**, which makes the computer repeat line 20 over and over.

6. The only key that will stop the program is the stop execution key. Try pressing it. The prompt symbol appears at the bottom and lets you know the computer is ready to receive another command or statement.

7. You could put in a new name on line 20. Try it. Type:

20 PRINT "new name"

and press **ENTER/RETURN**. Type **RUN** and press **ENTER/RETURN**. The new name appears. Notice that by typing an existing line number with new information following, you replace the old information with new information, whereas a new line number will add another line in numerical order.

8. Add the following lines and run the program:

20 PRINT "your name"

22 PRINT "your address"

24 PRINT "your city, state, zip"

What happened? _____

9. To print your name and address only once, retype line 30 as follows:

30 END

Press **ENTER/RETURN**. Type **RUN** and press **ENTER/RETURN**.

10. Try some other names and addresses by retyping lines 20, 22 and 24.

What have you told the computer to do? _____

When could you use the **PRINT** command? _____

Are You Ready to Write Your Own Program?

1. Type the new program command and press the **ENTER/RETURN** key.

2. Write a short program to clear the screen, print the day, month and year on one line and run the program.

Write your program below. Remember to include line numbers beside each line.

3. Now type your program into the computer and run the program. If the day, month and year do not appear on the screen, then type **LIST** and press **ENTER/RETURN**. Check for your mistake and correct it by typing the line over. Did you get information from the previous program? If so, remember to type **NEW** when starting a new program.

Activity 2. Punctuation , ; : It Changes Things!

You will learn the importance of the comma, semicolon and colon (, ; :) with the print to video instruction.

1. Prepare the computer for a new program by pressing the stop execution key, clear key and **ENTER/RETURN**. Type the new program command and press **ENTER/RETURN**.
2. Locate the following instructions in the table, and write the commands or statements for your computer in the spaces to the right of the instructions.

Instructions

Write Your Program

10 Clear the screen

20 Print to video "your name"

30 Go to line 20

Run the program

No punctuation after **PRINT " "** causes your name to be printed how?

3. Stop the program and clear the screen. (Remember how?)
Type in a new line 20 by adding a *comma* at the end:

20 PRINT "your name",

Run this program. Your name will be printed in how many columns? _____

4. Stop this program. Type a new line 20 by adding a *semicolon* in place of the comma:

20 PRINT "your name";

Run this program. Your name will fill the screen and may "march" left or right, depending on the spaces in your name. Why? _____

5. Stop the program and add a few *spaces* to your name between the " ", such as:

20 PRINT "your name ",

Then run the program. What is the difference? _____

6. Stop the program and type a new line 20 with a *colon* and another **PRINT** command on the same line:

20 PRINT "your name":PRINT "your address"

Run this program.

What does the colon permit you to do? _____

7. Stop the program and type a new line 20 with multiple commas on the same line.

20 PRINT "your name", "your favorite food", "your weight"

Run this program. Then press the stop execution key.

What do the multiple commas produce on the video display?

8. Stop the program and type a new line 20 with multiple semicolons on the same line. Insert your favorite number between the quotes.

20 PRINT "your favorite number"; "your favorite number minus one";

Run this program. Press the stop execution key. What do the multiple semicolons produce on the video display?

How would a single semicolon after **PRINT " "** cause your name to be printed?

Are You Ready to Write Your Own Program?

1. Prepare the computer for a new program.
2. Write a program to clear the screen and print your name and city on one line in columns. On the next line print your favorite hobby and then your birthday. The video display should look as follows:

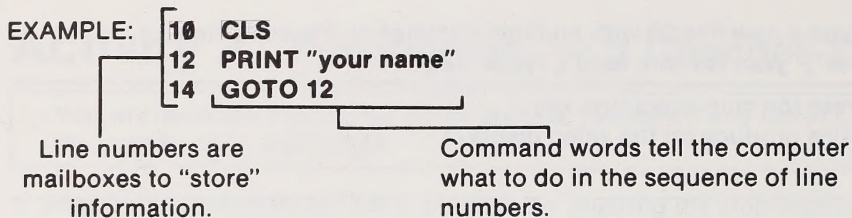
your name	your city
your hobby	your birthday

Write your program here. Remember to write the line numbers beside each line.

3. Now type your program into the computer. Type **RUN** and press **ENTER/RETURN**. If the program does not work, press the clear key, type **LIST** and press the **ENTER/RETURN** key to see your program and check for a mistake. To correct a mistake, retype the line number and a new or corrected statement.

The Importance of Line Numbers

The line numbers you have been using, 10, 20, 30, 40, etc., are like mailboxes. Each one holds or stores information. You could have used the numbers 12, 13, 16, 17, 18 or 300, 330, 360, 361, etc. The line numbers are not a part of the commands you give the computer.



Frequently numbers will be omitted between numbered lines so that other lines of information may be added later. Usually line numbers will increase by 10, to allow you to go back and add extra information if needed. The computer automatically arranges the lines in sequence beginning with the smallest number and ending with the largest number. It "executes" the commands in the same sequence, unless a special command, such as **GOTO**, tells the computer to "jump" to some other line number.

Let's Review

You have used lots of new words and symbols to communicate with the computer. Stop for a moment and write the meaning for these computer commands or statements.

CLS or **HOME** _____

GOTO _____

PRINT " ", _____

PRINT " "; _____

PRINT " ": _____

If you had trouble remembering the meaning for these computer commands, refer to the first two activities. Do not go on until you know and understand these commands and keys.

Activity 3. Where Am I?

You will learn how to print in different columns.

1. Clear the computer for a new program. (Remember how from Activities 1 and 2?)
2. Locate the following statements in the table, and write them in the appropriate language for your computer in the spaces to the right of the statements. Then type your program into the computer!

Instructions

10 Clear the screen

20 Print in column 25 "your name"

30 Go to line 20

Run the program

Write Your Program

Remember to press **ENTER/RETURN** key after each command.

With this program you can position your name anywhere on the line by putting a column number in the ().

3. Stop the program and clear the screen.
4. Type in a new line 20 as above except changing the column 25 to some other number that is not larger than the screen width. Run the program. Do you see how you can move your name anywhere on the horizontal line?

Understanding the Print Command

The **PRINT** command is used as an "output" command to show results on the video display. There are several forms or versions of the **PRINT** command. Here are some of the easy ones.

PRINT TAB(n):

This command prints information at a specified tab or column position anywhere from 0 (the left of the screen) to the end of the screen line. You put the desired position number in the (). A blank space between the T's of **PRINT** and **TAB** is optional on some microcomputers and required by other microcomputers. Using the blank space is good for clear reading of the statement, therefore, its use is recommended. *Do not* put a space between **TAB** and (). For example:

```
PRINT TAB(3) "name";TAB(20) "address";  
PRINT TAB(3) "city, state, zip code"
```

To put several items on the same line, use a semicolon after each entry and repeat **TAB(n)**.

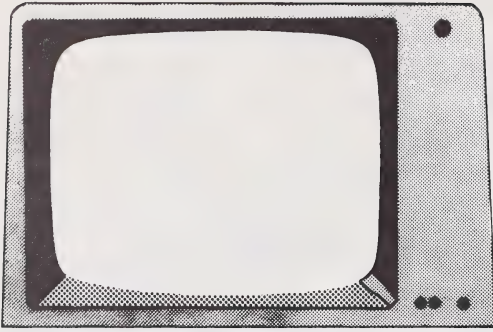
PRINT

The command **PRINT** alone will cause a blank line to be added; it is useful when you want to put blank lines in your output on the video display.

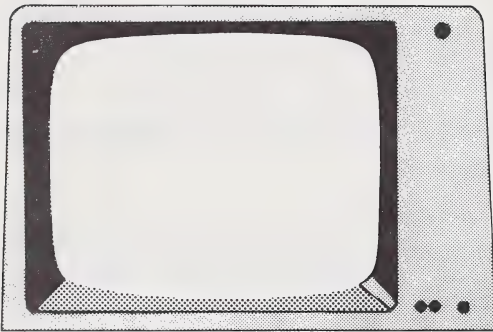
Exercises Using the Print Command

1. Write on the video display outline below where the **PRINT** commands will print the words.

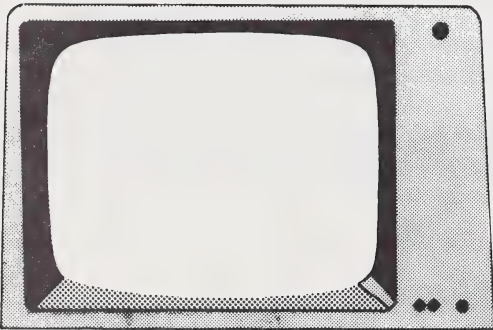
a. 10 PRINT "FRED"



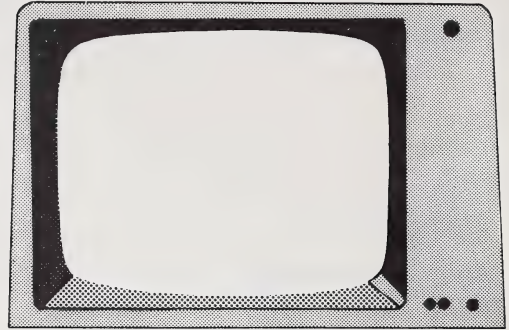
b. 10 PRINT TAB(20) "SALLY"



c. 10 PRINT "SALLY LEAPER"
20 PRINT "2468 SHORT STREET"
30 PRINT "PARIS, KY 42471"



d. 10 PRINT "TIM ANGEL";TAB(15) "103 STATE ST"
20 PRINT TAB(10) "MIDWAY, KY 40671"



2. Write the **PRINT** commands that tell the computer to print the information below.

1	5	30	35

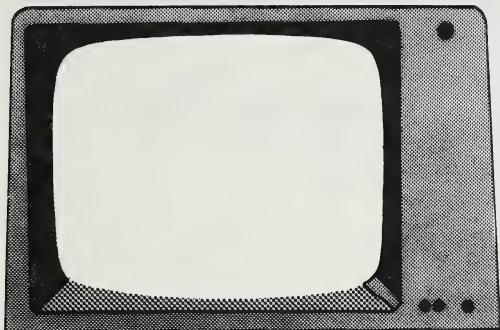
	STUDENT'S NAME	AGE	GRADE

1.	JERRY BROWN	10	5
2.	SUZY JONES	12	7
3.	JOHN SMITH	9	4
4.	TOM NELSON	16	10

Write your program here:

Run your program to see how you did. Did you write it correctly? _____

3. Think of some information (poem, verse, message, letter, etc.) you would like to program into the computer. Write it on the video display outline below. Then write **PRINT** commands to program the information into the computer.



Write your program here:

Type the program and run it. Does it look the way you thought it would? _____ If not, rework it until it appears on the video display properly.

Activity 4. A Pinch Hitter!

You will learn how to use a variable for characters, and a variable for numbers.

1. Clear the computer for a new program.
2. Locate the following instructions in the table. Write them in the appropriate language for your computer in the spaces to the right of the instructions.

Instructions

Write Your Program

10 Clear the screen

**20 A variable for character =
"your name"**

**30 Print to video the variable
for characters**

40 Go to line 30

Does this program look familiar? Where did you get the same results on the screen?

What is different? _____

3. A variable is used to represent or "pinch hit" for something else. By using a variable, you can use one or two letters for a long name or other information. The symbol \$ after the letter A tells the computer to expect letters or words. For humans, a dollar sign \$ indicates money. The computer understands this symbol to mean that alphabetic letters are coming. Stop the program and retype line 30 as follows. Then run the program again.

30 PRINT A\$, (Use the comma.)

4. Then try:

30 PRINT A\$; (Use the semicolon.)

and run the program.

5. A letter without the \$ symbol is a pinch hitter (variable) for a number, not a letter. Try the following lines and run the program.

20 X = 1

30 PRINT X

(Remember, **PRINT 3 - 2** was used in *4-H Computer Project I, Learning About Computers*.)

Activity 3. Where Am I?

You will learn how to print in different columns.

1. Clear the computer for a new program. (Remember how from Activities 1 and 2?)
2. Locate the following statements in the table, and write them in the appropriate language for your computer in the spaces to the right of the statements. Then type your program into the computer!

Instructions

10 Clear the screen

20 Print in column 25 "your name"

30 Go to line 20

Run the program

Write Your Program

Remember to press **ENTER/RETURN** key after each command.

With this program you can position your name anywhere on the line by putting a column number in the ().

3. Stop the program and clear the screen.

4. Type in a new line 20 as above except changing the column 25 to some other number that is not larger than the screen width. Run the program. Do you see how you can move your name anywhere on the horizontal line?

Understanding the Print Command

The **PRINT** command is used as an "output" command to show results on the video display. There are several forms or versions of the **PRINT** command. Here are some of the easy ones.

PRINT TAB(n):

This command prints information at a specified tab or column position anywhere from 0 (the left of the screen) to the end of the screen line. You put the desired position number in the (). A blank space between the T's of **PRINT** and **TAB** is optional on some microcomputers and required by other microcomputers. Using the blank space is good for clear reading of the statement, therefore, its use is recommended. *Do not* put a space between **TAB** and (). For example:

```
PRINT TAB(3) "name";TAB(20) "address";  
PRINT TAB(3) "city, state, zip code"
```

To put several items on the same line, use a semicolon after each entry and repeat **TAB(n)**.

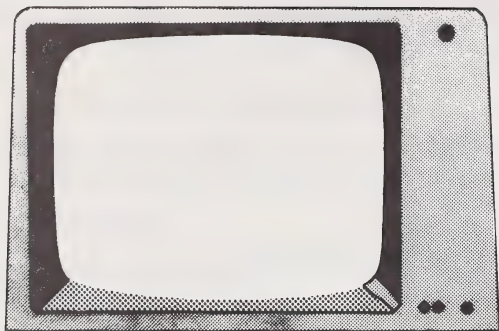
PRINT

The command **PRINT** alone will cause a blank line to be added; it is useful when you want to put blank lines in your output on the video display.

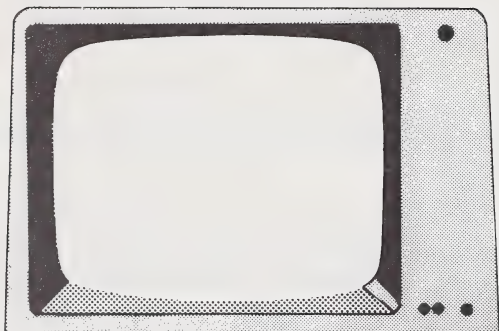
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1. Write on the video display outline below where the **PRINT** commands will print the words.

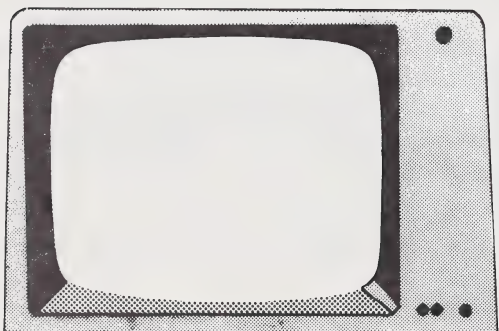
a. 10 PRINT "FRED"



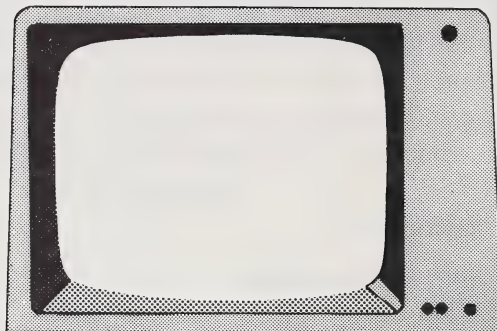
b. 10 PRINT TAB(20) "SALLY"



c. 10 PRINT "SALLY LEAPER"
20 PRINT "2468 SHORT STREET"
30 PRINT "PARIS, KY 42471"



d. 10 PRINT "TIM ANGEL";TAB(15) "103 STATE ST"
20 PRINT TAB(10) "MIDWAY, KY 40671"



2. Write the **PRINT** commands that tell the computer to print the information below.

1	5	30	35

	STUDENT'S NAME	AGE	GRADE

1.	JERRY BROWN	10	5
2.	SUZY JONES	12	7
3.	JOHN SMITH	9	4
4.	TOM NELSON	16	10

Write your program here:

Run your program to see how you did. Did you write it correctly? _____

5. Stop the program. Retype lines 15, 20, and 32 as follows:

```
15 PRINT "ENTER YOUR NUMBER"  
20 INPUT X  
32 PRINT X
```

Type **RUN** and press **ENTER/RETURN**. The computer is waiting for data from the keyboard. There may be a prompt on the screen or the computer may be just waiting without a prompt. After the input prompt, type your favorite number and press **ENTER/RETURN**. Remember, variables without \$ will accept only numbers from the user. What happened?

6. Stop the program. **LIST** the program. Retype lines 15, 20 and 32 as follows:

```
15 PRINT "ENTER YOUR MESSAGE"  
20 INPUT A$  
32 PRINT A$
```

Type **RUN** and press **ENTER/RETURN**. After the input prompt, type your name or message. Press **ENTER/RETURN**. What happened?

7. Stop the program. **LIST** the program, retype lines 32 and 45 as follows:

```
32 PRINT "OUTPUT",A$  
45 GOTO 31
```

Run the program. After the input prompt, type your name or message and press **ENTER/RETURN**. What happened?

8. Can you think of some uses for the **INPUT** command? _____

9. Stop the program. **LIST** the program and retype lines 20 and 32 as follows:

```
20 INPUT A$,B$  
32 PRINT A$,B$,A$
```

Run the program. After the input prompt appears type: **HI, THERE**. Make sure you place the comma to separate the two inputs. Press **ENTER/RETURN**. What happened?

10. Stop the program. **LIST** the program and retype line 15, 20 and 32. Type a new line 33.

```
15 PRINT "ENTER NAME AND GRADE"  
20 INPUT X$,Y  
32 PRINT X$  
33 PRINT Y  
45 PRINT
```


Type **RUN** and press **ENTER/RETURN**. After the input prompt, type your name and your grade in school separated by a comma. Remember that the \$ symbol after a letter indicates alphanumeric information—information containing letters and numbers. Without the \$ symbol the numbers are the only data that the computer will accept. What happened?

Before You Write Your Own Program

1. Prepare your computer for a new program.
2. Locate the following instructions in the table and write the commands or statements for your computer in the spaces to the right of the instructions.

Instructions	Write Your Program
10 Clear the screen	<hr/>
20 Input data using two variables for numbers	<hr/>
30 Print to video one variable for numbers;"+"; additional variable for numbers	<hr/>
40 End of program	<hr/>
Run the program	<hr/>

3. After the input prompt or once the machine is in a waiting state, type: **3,1**. Make sure you place the comma to separate the two inputs. Press **ENTER/RETURN**. What happened?
-
-

4. Now retype line 30 as below:

30 PRINT X;"+";Y;"=";X=Y

Run the program. Input the numbers **3,1**. Make sure you place the comma properly. The output should look as below:

3+1 = 4

Did you get the right output? _____

5. Stop the program and clear the video. Type **LIST**, press **ENTER/RETURN**. Notice line 30 with the **X+Y** at the end of the statement. Remember how we used the calculator in 4-H Computer Project I to find the answer to **X+Y**? For example, **PRINT 3+1** will compute and print **4** on the computer video. The statement above using X and Y as variables works in the same manner. The semicolons, as you should already know, display every item following one another on the *same* line. Now try writing your own program using the same ideas in this exercise.

Are You Ready to Write Your Own Program?

1. Prepare the machine for a new program.

2. Write a program with the input variables of X and Y. The values of X and Y are not given. You must input them with an input statement and enter them from the keyboard. Then compute and print the sum, difference, product and quotient of the two numbers X and Y with a title heading called **RESULTS**. Review the section "Before You Write Your Own Program" to help you solve the program. For example, the output would look like this if the inputs were 3 for X and 2 for Y.

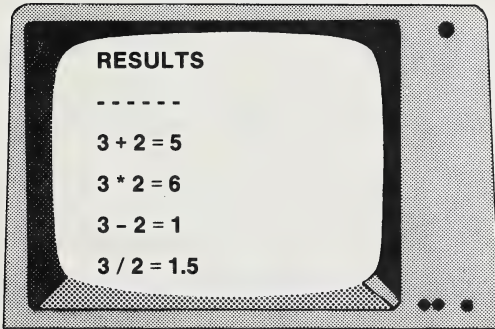
RESULTS

5

1

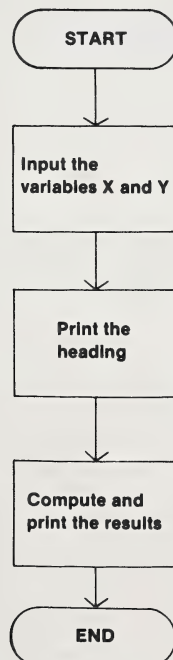
6

1.5



3. The program should accept the two inputs separated by a comma.

4. To help you write your program look at the following flowchart. It shows the order in which the computer will read and perform your program directions. (For an explanation of a few flowchart symbols refer to p. 36.)



Write your program here:

Let's Review

Stop for a moment and answer these questions.

1. What command word will show your program on the screen? _____
2. What does a \$ symbol mean to a computer when you are using it after a variable in the commands? _____
3. What does a **TAB(25)** mean to the computer when used in a **PRINT** statement?

4. What program command allows you to enter data from the keyboard to the computer within a program? _____

If you had trouble with these questions, refer to the first five activities. Do not go on until you know and understand the answers to the questions.

Activity 6. Is It True?

You will learn the instruction: IF an expression is true THEN perform certain commands.

1. Clear the video and memory for a new program.
2. Locate the following instructions in the table. The sample program shows the proper commands for one computer.

Instructions	Sample Program
10 Clear the screen	10 CLS
20 A variable for numbers equal to 1	20 X = 1
30 IF X equals 1 is true THEN print to video "TRUE"	30 IF X=1 THEN PRINT "TRUE"
40 End of program	40 END
Run the program	RUN

Now do the same program for your machine by looking up the instructions and writing the statements and commands.

Instructions	Write Your Program
10 Clear the screen	_____
20 A variable for numbers equal to 1	_____
30 IF X equals 1 is true THEN print to video "TRUE"	_____
40 End of program	_____
Run the program	_____

Type your program into the computer. Type **RUN**. Press **ENTER/RETURN**. The program should print **TRUE** because the condition $X = 1$ is true. Type **NEW** when finished to get ready for the program below.

3. Try this program on your own:

Instructions	Write Your Program
10 Clear the screen	_____
20 A variable for numbers equal to 4	_____

30 IF X is greater than 3 THEN
print in column 10 "TRUE"
(Hint: Look up the greater than
symbol in the table.)

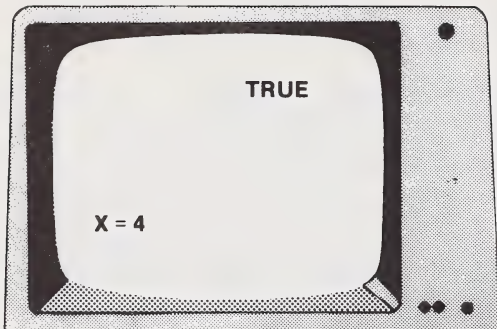
40 PRINT to video "X=" and the
variable for numbers

50 End of program

Run the program

What did the program print on the screen? _____

The program should have printed:



The expression X is greater than 3 is true, and as a result, the word **TRUE** and X=4 are printed on the screen. If the variable X is not greater than 3 (a FALSE condition), the computer will skip anything listed after the **THEN** in the IF...THEN statement, and the program execution continues on the next line. Therefore, the command **PRINT "TRUE"** would never be executed by the computer when the program is run.

4. Stop the program. Type in a new line 20 by changing the 4 to a 2 as follows:

20 X = 2.

Run this program. What is printed now? _____

It should have been printed only **X = 2** because 2 is less than 3. (Look up the less than symbol in the list on p. 5.) Thus, the **IF** statement is false. The computer skips what follows **THEN** and prints X=2 as stated by the next line.

Are You Ready to Write Your Own Program?

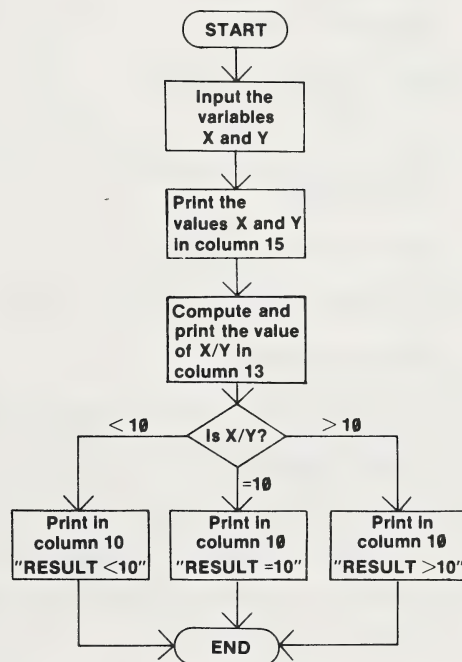
1. Prepare the machine for a new program.
2. Write a program to input values for the variables X and Y. The program should print the message **RESULT < 10** if the quotient of X divided by Y is less than 10, the message **RESULT > 10** if the quotient is greater than 10, and the message **RESULT = 10** if the

quotient equals 10. For example, with inputs $X = 3$ and $Y = 1$ the output should look the same as below including printing the right columns.

Columns: 0-----10-----15-----

$X = 3$
 $Y = 1$
 $X/Y = 3$
RESULT 10

3. To help you write your program look at the following flowchart. It shows the order in which the computer will read and perform your program directions.



Write your program here:

4. Type **RUN** and press **ENTER/RETURN**. If the program doesn't work, then clear the video and list the program to check for a mistake. To correct the problem, retype the line number and the new statement. Keep trying until you get a correct program—this process of correcting your logic is valuable in computer programs.

5. What part of this program caused you the most trouble? _____

Activity 7. Counting Fast!

You will learn how to use a variable for numbers and index from a low value to a high value in a loop with a next command step increment.

1. Prepare the computer for a new program.
2. Locate the following instructions in the table and write them in the appropriate commands for your computer in the spaces to the right of the instructions.

Instructions

Write Your Program

10 Clear the screen

20 For variable for numbers
= 1 to 10

30 Print to video the variable
for numbers

40 Next variable for numbers

50 End of program

Run the program

Did your program run successfully the first try? _____ If not, check for mistakes and try again.
If the program did run, can you count this fast? _____

The **FOR...NEXT** command forms a loop that causes the computer to count from the smaller value given to the larger value and perform the statements between the **FOR** line and the **NEXT** line. In this example, the value of X, the "counter," is printed out during each time through the "loop." (NOTICE: The loop is increased by 1 until it reaches 10.)

3. Retype line 20 as below and run the program.

20 FOR X = 1 to 20 STEP 2

What does the **STEP** command do? _____

4. List your program.

5. Now retype line 30 as below and run the program.

30 PRINT X, X + 1 (Notice the comma.)

How did the numbers appear on the video? _____

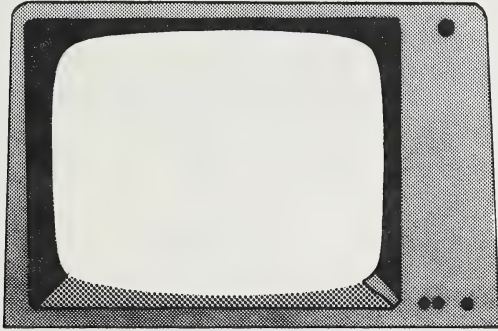
Are You Ready to Write Your Own Program?

1. Prepare the machine for a new program.
2. Write a program to loop through the numbers 1 to 20 with a **STEP** of 2 and print the odd numbers. Print the output in the same format as on the following page. After the odd numbers

4. List the program. Type line 20 as follows:

```
20 PRINT USING "###";6:PRINT USING "###";116:PRINT USING "###";43:  
PRINT"----":PRINT USING "###";6 + 116 + 43
```

(Double-check your typing before pressing **ENTER/RETURN**.) Run the program and write in the box how the numbers appeared.



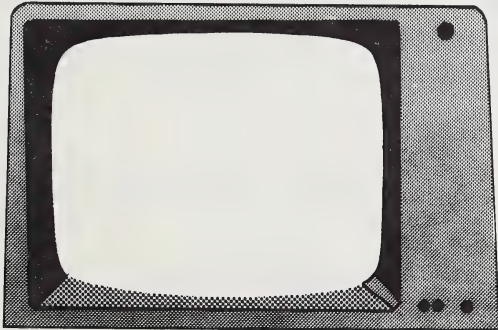
What did the command **USING "###";** do? _____

What is the difference between the video displays in numbers 3 and 4? _____

5. List the program. Retype line 20 and add lines 22 and 24 as follows:

```
20 PRINT USING "###.##";5.14  
22 PRINT USING "$###.##";5.14  
24 PRINT USING "$$#.##";5.14
```

Run the program and write in the box how these numbers appeared.

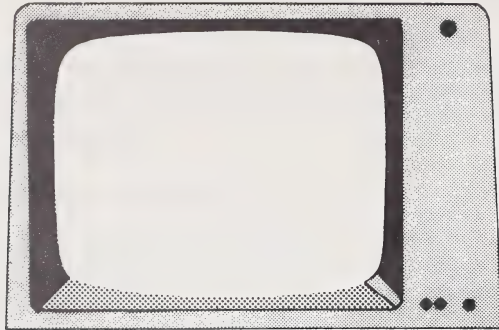


What was different about these commands? _____

6. List the program. Retype lines 20, 22 and 24 as follows:

20 PRINT USING "###,###.##";1234.56
 22 PRINT TAB(7) USING "###,###.##";1234.56
 24 PRINT USING "I OWE JOE \$\$###.##";5

Run the program and write in the box below how these numbers and words appeared.



Let's Review

1. To test your knowledge answer the following questions by checking true or false.

The command **PRINT 38** aligns the numbers by a left-hand column: T__ F__

The command **PRINT USING "###";38** aligns the number by a right-hand column: T__ F__

The command **PRINT USING "\$###.##";1.51** puts a \$ sign beside the number (no blank spaces): T__ F__

The command **PRINT USING "\$\$###.##";1.51** puts a \$ sign beside the number (no blank spaces): T__ F__

2. Write a statement with the **PRINT**, **TAB** and **USING** commands to properly show the following information on the video display, beginning in column 5: **MY BANK ACCOUNT IS \$1,234.56**

Important to Remember

- Use a # symbol for each digit in your number, plus one extra for a minus sign if one should occur.
- Use a . to show where you want the decimal to be.
- Use two \$ symbols to put the \$ sign beside the number (no blank spaces).
- Place a comma properly in the # symbols to produce a comma in the printed number.
- Use TAB(n) command to place numbers or words in a desired column.
- Words as well as numbers can be included in the USING command by putting the words within the quotations.

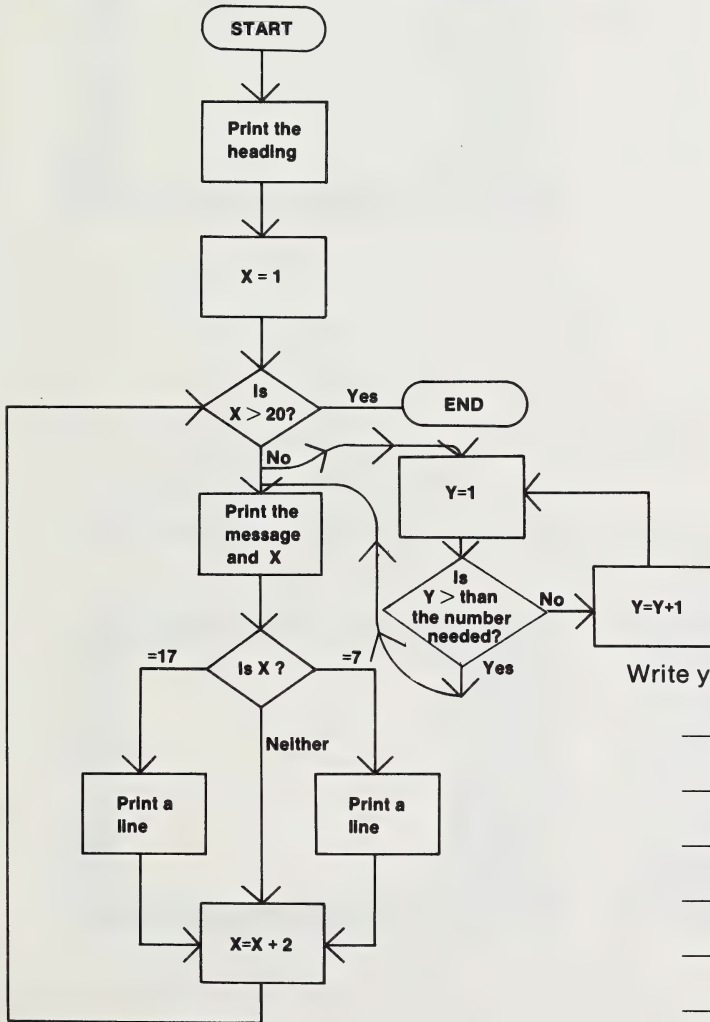
Answers: 1. T 2. T 3. F 4. T

Are You Ready to Write Your Own Program?

1. Prepare the machine for a new program.

2. Write the same program as in Activity 7 with a timer. This program should loop through the numbers 1 to 20 with step of 2 for computing odd numbers. Following the same output, program a timer with a 2-second time delay between each printed line. (EXAMPLE: On one machine FOR 1 to 400 is approximately equal to 1 second of time. You will have to find the high value for your own computer.)

3. To help you write your program look at the following flowchart. It shows the order in which the computer will read and perform your program directions.



Write your program here.

4. Run the program. If a problem occurs and the program doesn't execute properly, list the program. Check for any mistakes and correct them by typing the line number and the new line.

Activity 9. My Spending Money!*

You will learn how to print to video using the format symbols ### and print in columns using the same format symbols.

1. Clear the computer for a new program.
2. Locate the following instructions on the table. Then write them in the appropriate commands for your computer in the spaces to the right of the instructions.

Instructions

Write Your Program

10 Clear the screen

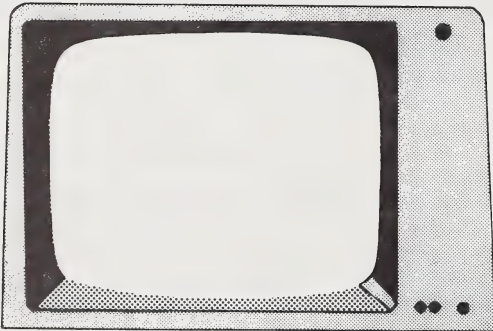
**20 Print to video the number 6
on one line
Print to video the number 116
on a second line
Print to video the number 43
on a third line
Print to video four dash marks
on a fourth line
Print to video the sum of
6+116+43 on a fifth line**

29 Print to video two blank lines

30 End of program

Run the program

3. Write in the box below how the numbers appeared on the video. (Be careful to line them up the way that they appear on the screen.)

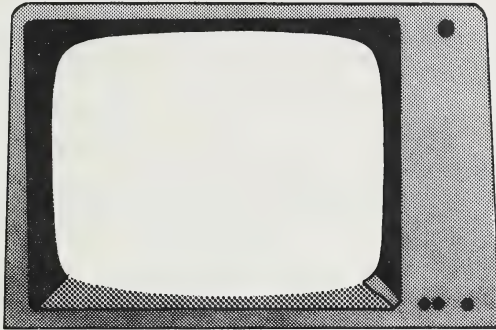


*The commands in Activity 9 are not usable on all microcomputers.

4. List the program. Type line 20 as follows:

```
20 PRINT USING "###";6:PRINT USING "###";116:PRINT USING "###";43:  
PRINT"----":PRINT USING "###";6 + 116 + 43
```

(Double-check your typing before pressing **ENTER/RETURN**.) Run the program and write in the box how the numbers appeared.



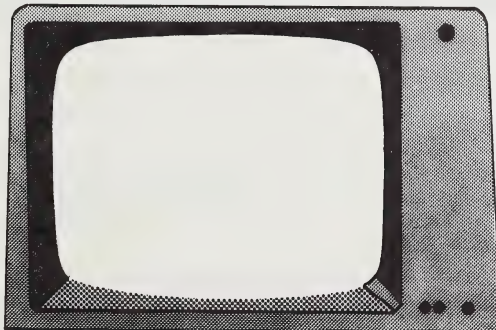
What did the command **USING "###";** do? _____

What is the difference between the video displays in numbers 3 and 4? _____

5. List the program. Retype line 20 and add lines 22 and 24 as follows:

```
20 PRINT USING "###.##";5.14  
22 PRINT USING "$###.##";5.14  
24 PRINT USING "$$###.##";5.14
```

Run the program and write in the box how these numbers appeared.

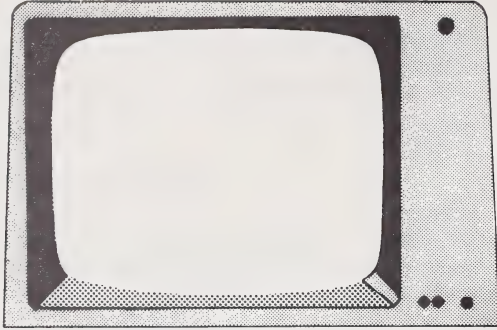


What was different about these commands? _____

6. List the program. Retype lines 20, 22 and 24 as follows:

20 PRINT USING "###,###.##";1234.56
 22 PRINT TAB(7) USING "###,###.##";1234.56
 24 PRINT USING "I OWE JOE \$\$###.##";5

Run the program and write in the box below how these numbers and words appeared.



Let's Review

1. To test your knowledge answer the following questions by checking true or false.

The command **PRINT 38** aligns the numbers by a left-hand column: T__ F__

The command **PRINT USING "###";38** aligns the number by a right-hand column: T__ F__

The command **PRINT USING "\$###.##";1.51** puts a \$ sign beside the number (no blank spaces): T__ F__

The command **PRINT USING "\$\$###.##";1.51** puts a \$ sign beside the number (no blank spaces): T__ F__

2. Write a statement with the **PRINT**, **TAB** and **USING** commands to properly show the following information on the video display, beginning in column 5: **MY BANK ACCOUNT IS \$1,234.56**

Important to Remember

- Use a # symbol for each digit in your number, plus one extra for a minus sign if one should occur.
- Use a . to show where you want the decimal to be.
- Use two \$ symbols to put the \$ sign beside the number (no blank spaces).
- Place a comma properly in the # symbols to produce a comma in the printed number.
- Use TAB(n) command to place numbers or words in a desired column.
- Words as well as numbers can be included in the USING command by putting the words within the quotations.

Answers: 1. T 2. T 3. F 4. T

Activity 10. How Big Is Big?

You will learn the meaning of these words: size of numbers, integer, single precision and double precision variables.

1. Clear the computer for a new program.
2. Locate the following instructions on the table. Then write them in the appropriate commands for your computer in the spaces to the right of the instructions.

Instructions	Write Your Program
10 Clear the screen	
20 Print to video the message "AN INTEGER IS A WHOLE NUMBER WITHOUT A DECIMAL."	
25 Print to video the message "AN INTEGER NUMBER CANNOT BE LARGER THAN 32,767 ON SOME MACHINES."	
30 Print to video the message "A SINGLE PRECISION NUMBER HAS A DECIMAL AND UP TO 6 ACCURATE DIGITS."	
35 Print to video the message "A DOUBLE PRECISION NUMBER HAS A DECIMAL AND UP TO 16 ACCURATE DIGITS."	
40 Print to the video the message "THE FOLLOWING ARE EXAMPLES FOR C=4/3."	
45 Set a variable for numbers equal to 4	
46 Set an additional variable for numbers equal to 3	
47 Set an integer variable equal to the first variable for the number divided by the additional variable for numbers	
48 Set a single precision variable equal to the first variable for numbers divided by the additional variable for numbers	
49 Set a double precision variable equal to the first variable for numbers divided by the additional variable for numbers	

*The material in Activity 10 is not usable on all machines. If the material is not applicable to your machine then read over the material. You will learn some important concepts about the size of numbers.

50 Print to video "INTEGER =";
and the integer variable

55 Print to video "SINGLE
PRECISION ="; and the single
precision variable

60 Print to video "DOUBLE
PRECISION ="; and the double
precision variable

65 End of program

Run the program

If you do homework and divide 4 by 3, what result do you get? _____

What result did the computer give?

INTEGER = _____

SINGLE PRECISION = _____

DOUBLE PRECISION = _____

Which result is most accurate? _____

Which result is least accurate? _____

3. The symbol % after a variable tells the computer to make the number an INTEGER. In the same way, the symbol ! means SINGLE PRECISION and # means DOUBLE PRECISION. Engineers designing the machine make these decisions.

Use the symbols %, ! or # to tell what type number each of the following should be for proper accuracy.

NUMBER

SYMBOL

1. 1046

2. 1.347

3. -5

4. 1,632.4478

5. 0.44789

6. -1.345

Let's Review

Stop for a moment and answer these questions.

1. If you need a dollar sign next to numbers (for example, \$12.98), how would you write the computer command? _____

2. How would you ask the computer to do the following—print your name 10 times and after five names draw a line using the IF...THEN command? _____

If you have trouble with these questions, refer to the first 10 activities. Do not go on to the third project until you know and understand the answers to these questions.

Answers to number 3:

1. %
2. !
3. %
4. #
5. !
6. !

For More Information

- Check your local library for books on microcomputers.
- Go to the nearest retail store that sells microcomputers and ask to see a demonstration of the equipment.
- Ask the banks, travel agents and car dealers in your community if their records are computerized and how they use computers to do work.

Demonstrations and Illustrated Talks

Giving a 4-H demonstration can be a good learning experience for you and for others. Work with your leader in deciding on a good topic. You may want to:

- Explain some of the command words you have learned and show how they make the computer do what you want it to do.
- Demonstrate "how to program" a simple program on the computer.
- Make the 4-H pledge appear in the center of the screen.
- Use your imagination and come up with some good ideas!

Instructions

Keys for Typed Statements and Commands on Various Microcomputers

	A	B	C
1. Clear key	CLEAR	ESC & @	CTRL & HOME
2. Enter/Return key	ENTER	RETURN	←
3. Stop execution key	BREAK	CTRL & C	CTRL & SCROLL/LOCK
4. New program command	NEW	NEW	NEW
5. Clear the screen	CLS	HOME	CLS
6. Print to video the words	PRINT "WORDS"	PRINT "WORDS"	PRINT "WORDS"
7. Print to video a variable for numbers	PRINT X	PRINT X	PRINT X
8. Print to video the words and a variable for numbers	PRINT "WORDS";X	PRINT "WORDS";X	PRINT "WORDS";X
9. Print to video a variable for numbers and an additional variable for numbers	PRINT X;Y	PRINT X;Y	PRINT X;Y
10. Print to video a variable for characters	PRINT A\$	PRINT A\$	PRINT A\$
11. Print to video a variable for characters, and an additional variable for characters	PRINT A\$,B\$	PRINT A\$,B\$	PRINT A\$,B\$
12. Print to video a blank line	PRINT	PRINT	PRINT
13. Go to a line number	GOTO number	GOTO number	GOTO number
14. List command	LIST	LIST	LIST
15. Print in column n	PRINT TAB(n)	PRINT TAB(n)	PRINT TAB(n)
16. A variable for characters	A\$	A\$	A\$
17. An additional variable for characters	B\$	B\$	B\$
18. A variable for numbers	X	X	X
19. An additional variable for numbers	Y	Y	Y
20. Input information using the variable for characters	INPUT A\$	INPUT A\$	INPUT A\$

Instructions

Keys for Typed Statements and Commands on Various Microcomputers

	A	B	C
21. Input data using the variable for numbers	INPUT X	INPUT X	INPUT X
22. Input with a word prompt and a variable for characters	INPUT "WORDS";A\$	INPUT "WORDS";A\$	INPUT "WORDS";A\$
23. Input data using a variable for numbers and a variable for characters	INPUT X,A\$	INPUT X,A\$	INPUT X,A\$
24. IF an expression is true THEN perform certain commands	IF...THEN...	IF...THEN...	IF...THEN...
25. For variable for numbers = low to high	FOR X = low TO high	FOR X = low TO high	FOR X = low TO high
26. Next variable for numbers	NEXT X	NEXT X	NEXT X
27. Step increments	STEP	STEP	STEP
28. For variable for numbers = low to high STEP increments	FOR X = low TO high STEP... PRINT USING \$##.## C%	FOR X = low TO high STEP... None None None	FOR X = low TO high STEP... PRINT USING \$##.## C%
29. Print using			
30. \$##.##			
31. Integer variable			
32. Single precision variable	CI	None	CI
33. Double precision variable	C#	None	C#
34. Run the program	RUN	RUN	RUN
35. End of program	END	END	END

Flowchart Symbols

Ovals



Meaning

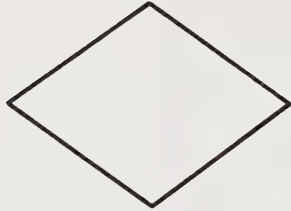
A START or STOP point in a flowchart

Square/rectangles



Indicates statements that tell what to do

Diamonds



Indicates decisions (Yes/No questions) or where choices are needed



4-H Computer Project II: *Learning About Programming*

PROJECT RECORD FORM

Name _____ School _____

County _____ Birth Date _____

Name of 4-H Club/Group _____ Today's Date _____

- A. Tell what you learned in this project (for example, learned how to operate the keyboard of a microcomputer).

- B. List any activity related to this project in which you participated, such as group meetings, tours, exhibits, demonstrations.

- C. List any awards or recognition you have received in this project.

- D. If you helped others with their computer project, give the number of people you helped and what you did to help them.

- E. Write a project story telling what you did and learned including how the project helped you, who helped you with the project, and why computers are important to us.

[illegible]

APPROVED:

Project Leader

Parent

